DOCUMENT RESUME

ED 205 378 SE 035 373

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TITLE Individualized Mathematics for Adults.
PUB DATE 81
NOTE 12p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adult Education: *Algebra: College Mathematics: Educational Research: Higher Education: *Individualized Instruction: Mathematics Instruction: *Program Descriptions: *Remedial Mathematics: Undergraduate Study
IDENTIFIERS Humboldt State University CA: *Mathematics Education Research: *Veterans Upward Bound

ABSTRACT

Adults who have chosen to interrupt their educational careers often face the problem of rusty academic skills. The Veterans Upward Bound Program at Humboldt State University developed a ten-week college preparatory program designed to help these people make the transition to college life with appropriate academic skills. Two different mathematics courses were offered. Based on scores on the McGraw-Hill Basic Skills System Mathematics Test students were sorted into a high skills algebra program or an individualized progressive basic mathematics through algebra program for the less well prepared. The individualized program utilized commercially available materials and was designed as a remedial or developmental program while the algebra class was taught in traditional lecture format. In three academic quarters the individualized program produced a greater degree of test score improvement and a greater than expected preparation of students for college algebra. (Author/MP)

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INDIVIDUALIZED MATHEMATICS FOR ADULTS

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ABSTRACT: Adults who have chosen to interrupt their educational careers often face the problem of "rusty" academic skills. The Veterans Upward Bound Program at Humboldt State University has developed a ten-week college preparatory program designed to help these people make the transition to college life with appropriate academic skills. Two different mathematics courses were offered. Based on scores on the McGraw-Hill Basic Skills System Mathematics Test students were sorted into a high skills algebra program or an individualized progressive basic math through algebra program for the less well prepared. The individualized program utilizes commercially available materials and is designed as a remedial/developmental program while the algebra class was taught in traditional lecture format. In three academic quarters the individualized program has shown itself to produce a greater degree of test score improvement and a greater than expected ability to produce students prepared for college algebra.

DISCUSSION: The Veterans' Upward Bound Program is an adult program designed to prepare people to perform successfully in post secondary education. The program encompasses reading, writing, study skills, literature, science, psychology, counseling, and mathematics. In the area of math students scoring 16 or less (generally) on the McGraw-Hill Basic Skills System Mathematics Test, Form A, worked in an individualized program--the others went into a lecture format algebra class. The avowed purpose of the Basic Math Program

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was to prepare students for Math 150, a non-credit basic algebra course preparatory to Math D, Intermediate Algebra, which offers university credit.

In the Basic Math Program students worked on individualized, self-paced programmed material. Mathematics skills development ranged from basic mathematics concepts of whole numbers to algebraic and quadratic equations and functions. The objectives of the course were to improve student performance. Periods of instruction were five hours per week for ten weeks. All students began with the Merrill Basic Mathematics Kit C (9th grade level) and progressed through the Key to Algebra booklets 1 through 4 and then into the text Introductory Algebra by Keedy and Bittinger or the SRA Algebra Kit. Introductory Algebra was the Math 150 text.

BASIC N = 27					ALGEBRA N = 31				
Part	Pre Score	Post Score	Change	%	Pre Score	Post Score	Change	%	
I	8.2	10.2	+2.0	+24%	12.7	14.1	+1.4	+11%	
II	3.4	7.0	+3.6	+106%	9.1	12.0	+2.9	+32%	(see Graph A)
Total	11.6	17.2	+5.6	+48%	21.8	26.1	+4.3	+20%	
Part	Pre %-ile	Post %-ile	Change	%	Pre %-ile	Post %-ile	Change	%	
I	24	38	+14	+58%	58	69	+11	+19%	
II	14	45	+31	+221%	60	79	+19	+32%	(see Graph B)
Total	19	41	+22	+116%	59	74	+15	+25%	
	13 Program Dropouts (48%)				9 Program Dropouts (29%)				
	13/14 Showed Improvement (92.9%)				19/22 Showed Improvement (86.4%)				

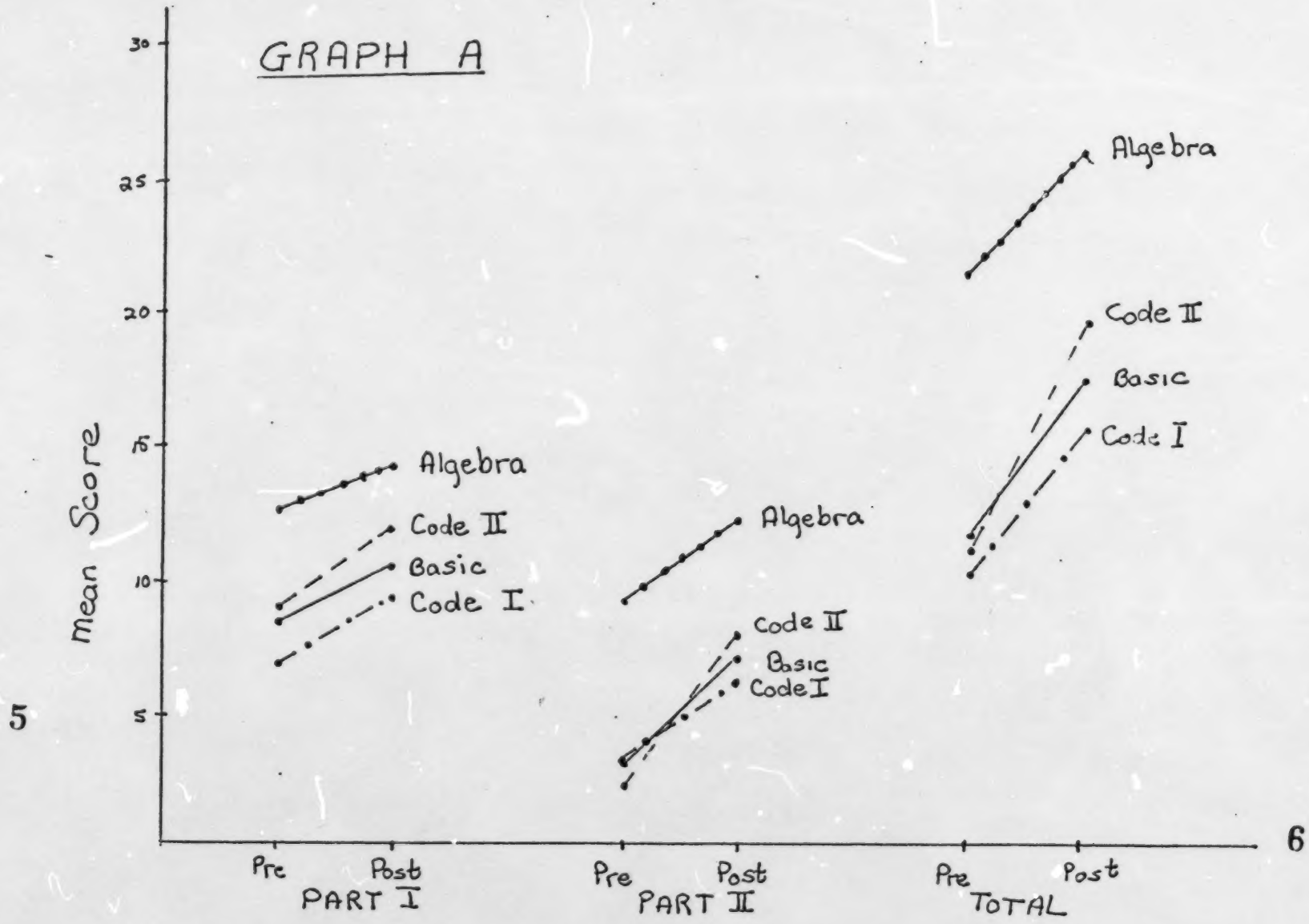
Twenty-seven students over 3 quarters were enrolled in Basic Math while 31 took the algebra program. Above is a comparative breakdown of pre- and

post-test results for the two groups. The percentile norms used were based on the reference group of two-year colleges or four-year institutions. Although there were three parts to the McGraw-Hill Test only the first two were used since the aim was to sort the students into those with basic algebra skills from those without.

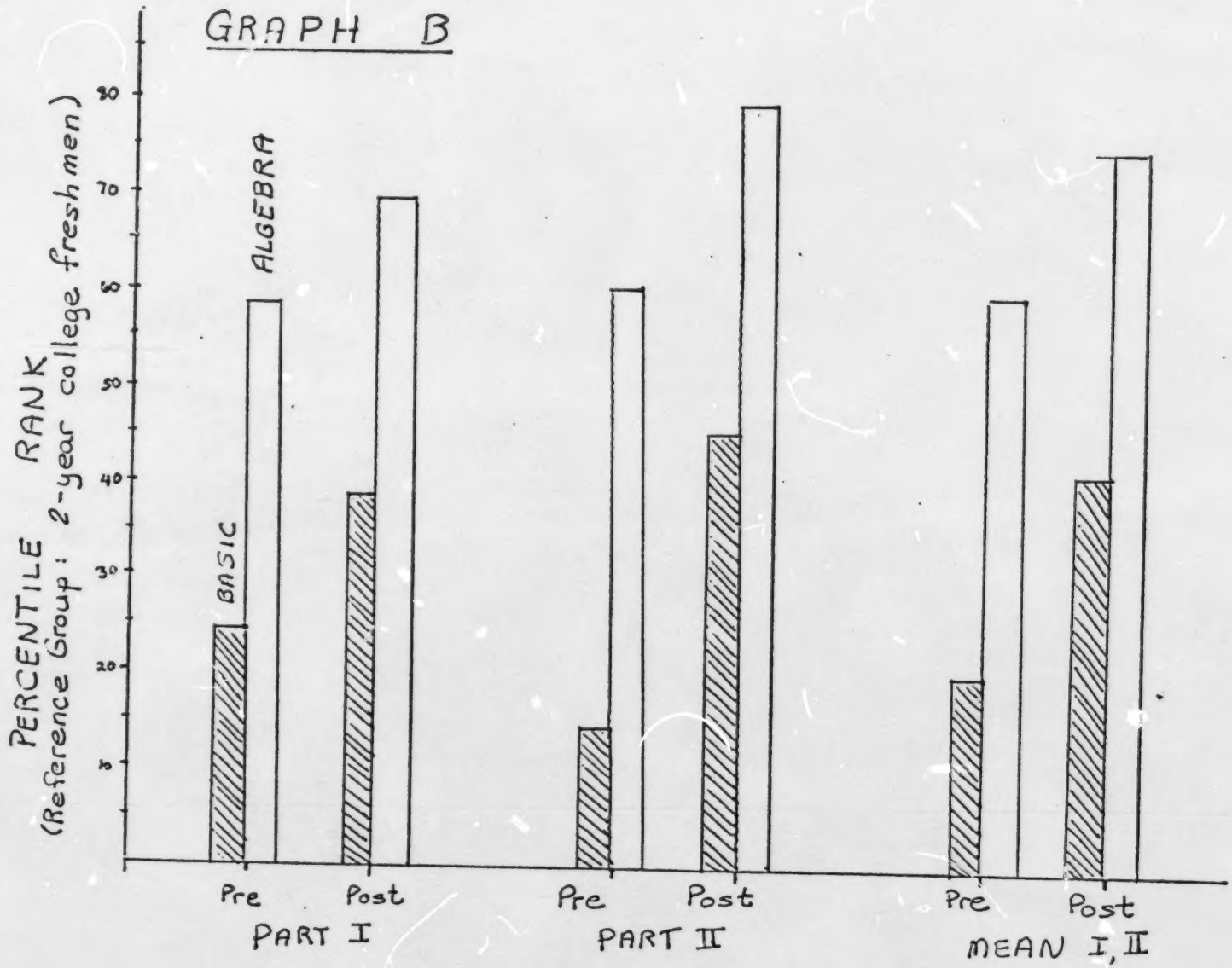
It is interesting to note that while both groups made improvements, the Basic Math group made the greatest gains both in absolute terms and percentile improvements. However, when the change in scores for both groups was tested for statistical significance, it fell short of the .05 level of confidence for Parts I and II and the Total. Both groups improved most in algebra. Graphs A and B depict the changes in relative scores and percentiles for both groups.

Also of interest is the observation that of the 9 students in the Basic Math groups who took the math placement test for Humboldt State University 5 placed into Math D. As of this date (9/79) 3 of the 4 students who enrolled in Math D passed the course and the other one withdrew. This was very much beyond the extent of the Basic Math course but indicated the flexibility of the program where the basic students could work in the 150 text having completed the Merrill program and the Key series.

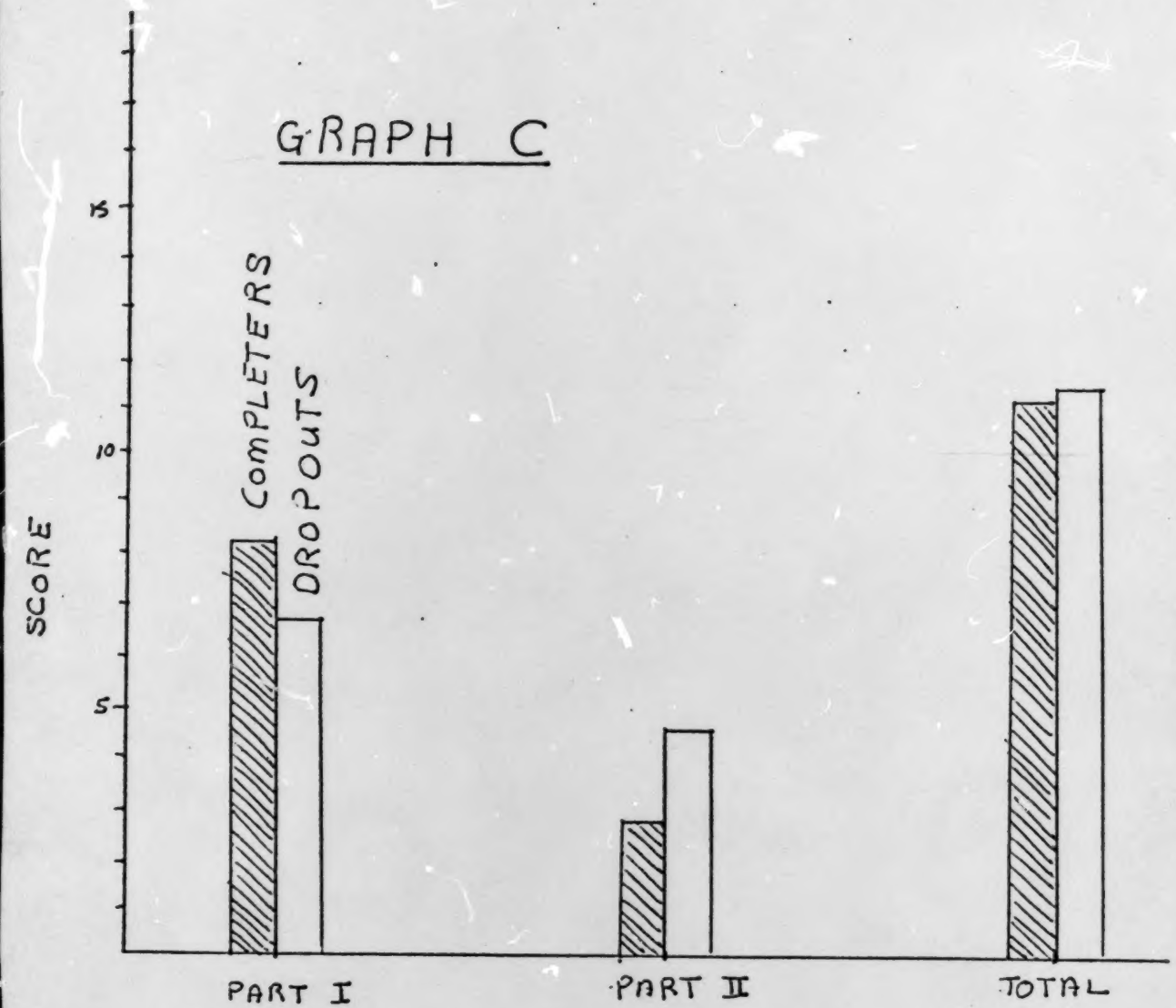
In comparing the performance on the pre-test of the basic students who took the post test and completed the course with the dropouts, the following results appeared (2 students who completed the program were not included in the statistics since one did not work in the regular class and one was not initially assigned to the basic group).


GRAPH A
30
25
20
15
10
5
Mean Score
Algebra
Code II
Basic
Code I
Algebra
Code II
Basic
Code I
Algebra
Code II
Basic
Code I
Pre
Post
PART I
Pre
Post
PART II
Pre
Post
TOTAL

GRAPH B


PERCENTILE RANK
(Reference Group: 2-year college freshmen)
10
20
30
40
50
60
70
80
BASIC
ALGEBRA
Pre
Post
PART I
Pre
Post
PART II
Pre
Post
MEAN I, II

GRAPH C



	COMPLETERS		DROPOUTS		COMPARISON	
Part	Score	%-ile	Score	%-ile	D-C	Dif/D
I	8.1	24	6.7	16	-1.4	-21%
II	2.8	14	4.5	22	+1.7	+37%
Total	10.9	19	11.2	18	+0.3	+3%

(see Graph C)

The arithmetic skills are weaker among the dropouts and the algebra stronger giving little net difference. In testing for statistical significance, of course, there is no significant difference in the overall scores. Even in the individual parts for Part I, $z = 1.53$ and for Part II $z = 1.73$ again giving less than a .05 level of confidence in the significance of the difference of the scores. Actually, having worked with the people, it is not clear to me what the distinction might have been. Some dropped because of employment; others lacked interest in the total program; others lacked motivation; and others had still other reasons. The only clear conclusion is that students in the basic math program were somewhat less likely to complete the ten-week session than those assigned to the algebra class.

In assessing the effectiveness of the math program, it is clear that the total system is viable. In comparing the effectiveness of the lecture versus the individualized program it does not follow that test score improvement is a linear function. For those who tested well it may be that they may have been at the upper limits of performance anyway and the basic students just had more room for improvement. Nevertheless, the Veterans' Upward Bound Program is accomplishing its mission--to prepare adult students for successful participation in college level math courses.

Also open to comparison are the relative scores of those in the basic class who were successful on the math placement test versus those who were not. Nine basic students took the math placement test. For purposes of this study one was dropped since he was initially assigned to the algebra class but elected to take basic math. He was successful on the math placement test (received a Code II). The following chart shows the pre- and post-test scores on the McGraw-Hill test and the score improvement for both groups: the Code II students succeeded in placing into college math; the Code I people were not successful.

	CODE II				CODE I			
Part	Pre Mean	Post Mean	Change	%	Pre Mean	Post Mean	Change	%
I	9.0	11.8	+2.8	+31%	6.8	9.3	+2.5	+37%
II	2.3	7.8	+5.5	+239%	3.5	6.3	+2.8	+80%
Total	11.3	19.6	+8.3	+73%	10.3	15.6	+5.3	+51%

(See Graph A)

Thus while both groups improved more than the general group of basic students the Code I group improved more in arithmetic (Part I) and the Code II people improved far more in algebra (Part II), which is reasonable since the math placement test emphasized algebra.

CONCLUSION: The individualized model has proved very successful for preparing students for college level work in mathematics. It is flexible enough to prepare students to perform beyond the minimum norms and actually compete with students who were initially more advanced. The basic students tended to make greater gains but drop out of the program more frequently

than those in the algebra class. Further, there is no way to predict from test performance who will stay with the program.

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